Visual Plume Analysis (67-75)

Visible Plume Modeling Results

67. *If the applicant performed a visible plume modeling analysis in support of the AFC Visual Resources conclusion, please provide the modeling results, any meteorological data used in the analysis, a full discussion of all assumptions, the name and version of the model used, and all model input and output files. If a modeling analysis was not performed, please provide any analysis that supports the visible water vapor plume discussion in the AFC.*

Response: Visible plume modeling is in progress and will be provided under separate cover.

Meteorological Data Files

68. *Please provide five years of meteorological data files in either the National Climate Data Center (NCDC) CD144 (surface data), NCDC-TD3280 (hourly surface observations with precipitation), or Hourly United States Weather Observations (HUSWO) format. The files should be the most recent years available. The files must include location, present weather, cloud cover, and visibility data. Please include a complete description of the source of this data (i.e. specific location, anemometer height, etc), and a discussion of why the data is representative of the area. Please also provide an electronic copy of the raw meteorological data file for each year.*

Response: Five (5) years of hourly Riverside Municipal Airport data in ASOS format will be used to prepare the meteorological data file for use by SACTI. The surface data at Riverside Municipal Airport will be combined with five years of San Diego Lindbergh Field upper air data (corrected to the surface temperatures at Riverside). Edwards Air Force Base does collect upper air data; however, the National Climatic Data Center has advised VSE that much of the Edwards data is missing. Thus, Lindbergh Field is the closest upper air station to the project site. Lindbergh Field is the nearest upper air station to the project site for which the most recent 5 years of data is available.

Riverside Municipal Airport data is considered a more representative data set than either Burbank for Long Beach for the following reasons:

1. *Proximity to the project site*: The Riverside Municipal Airport is the closest inland surface data set to the project site. Burbank and Long Beach are located at greater distances.

2. *Representativeness*: The Fullerton Municipal Airport data is considered more representative of the project site than either Burbank for Long Beach. Long Beach is heavily influenced by the close proximity of the Pacific Ocean and is thus more representative of a humid marine environment. Burbank, is not directly influenced by the marine environment, but is considerably influenced by the San Gabriel Mountain Range.

This data will be provided under separate cover.

Data Files

69. *Please also provide meteorological data files for the same five years in Industrial Source Complex (ISCST3) modeling format from the above data source. These files must include stability class data.*

Response: As stated above, VSE will provide the Riverside Municipal Airport surface data, in CD144 format, and the San Diego upper air data, in FSL format. We have not found it necessary to convert the data into an ISCST3 meteorological data set to conduct our visible plume analysis. These data sets can be directly processed into an ISCST3 format for use with that model.

Cooling Tower Operating Values

70. *Please provide the values for heat rejection, exhaust temperature, and exhaust mass flow rate that affect cooling tower vapor plume formation for a range of ambient conditions that represent reasonable worst-case operating scenarios. At a minimum, please fill in all blanks in the table below. Please also update/correct the table, if necessary.*

Cooling Tower Operating Values

Parameter	***Cooling Tower Exhausts***		
Number of Cells		*5 cells (in 1 x 5 array)*	
*Cell Height**		*11.89 meters*	
*Cell Diameter**		*6.71 meters*	
*Tower Housing Length**		*66.53 meters*	
*Tower Housing Width**		*11.28 meters*	
Ambient Temperature	*20°F*	*59°F*	*95°F*
Ambient Relative Humidity	*60%*	*60%*	*60%*
Heat Rejection (MW/hr)	___	___	___
Exhaust Temperature (°F)	___	___	___
Exhaust Flow Rate (lb/hr)	___	___	___

** Stack dimensions from AFC Table 8.1B-2. Tower length and width (not including circulating pumps) estimated from AFC Table 8.1B-3 and 8.1B-4.*

Response: Table DR70-1, below, presents the values for heat rejection, exhaust temperature, and exhaust mass flow rate that affect cooling tower vapor plume formation for a range of ambient conditions that represent reasonable worst case operating scenarios.

TABLE DR70-1
Cooling Tower Operating Values

Parameter	**Cooling Tower Exhausts**		
Number of Cells		5 cells (in 1 x 5 array)	
Cell Height*		11.89 meters	
Cell Diameter*		6.71 meters	
Tower Housing Length*		66.53 meters	
Tower Housing Width*		11.28 meters	
Ambient Temperature	20°F	59°F	95°F
Ambient Relative Humidity	60%	60%	60%

TABLE DR70-1
Cooling Tower Operating Values

Parameter	Cooling Tower Exhausts		
Heat Rejection (MW/hr)	**23**	**26.2**	**29**
Exhaust Temperature (°F)	**740**	**775**	**796**
Exhaust Flow Rate (lb/hr)	**1,710**	**1,686**	**1,622**

* Stack dimensions from AFC Table 8.1B-2. Tower length and width (not including circulating pumps) estimated from AFC Table 8.1B-3 and 8.1B-4.

Plume Mitigation

71. *Please indicate if the cooling tower has any plume mitigation features that would reduce the exhaust moisture content below the saturated level.*

Response: The cooling does not have any features specifically designed to mitigate plumes.

Cooling Tower Make and Model

72. *Please provide the cooling tower make and model number, and any vender documentation available for the specific model.*

Response: The cooling tower manufacturer has not yet been selected. However, possible selections include Cooling Tower Depot model number CFD-424230-51-30 and Marley model number F467A-4.0-05.

Vendor's Fogging Frequency Curve

73. *Please provide a fogging frequency curve from the cooling tower vendor, if available.*

Response: A fogging frequency curve is not yet available from the cooling tower vendor.

Cooling Tower Cell Operation

74. *Please indicate how many cooling tower cells will be turned on under different partial load conditions (i.e. when will all five cells be on, when will four cells be on, when will two cells be on, etc.?). Please also note if ambient conditions, such as cold temperatures, dictate when cells may be turned off.*

Response: There are a large number of possible cooling tower fan operating scenarios. In general, the number of operating cells will be proportional to the ambient temperature and plant output (MW). For example, with all five turbines operating at full load on a high ambient temperature day, all five cells would be in service. At the other extreme, if one turbine were operating at minimum load (50 percent) and the ambient temperature were very low, no cooling tower fans would be operating (although water would be circulated through the tower). Typically, one cell will be in service for each turbine that is operating.

Cooling Tower Fan Motors

75. Please confirm that the cooling tower fan motors will not have a variable speed/flow controller.

Response: The project does not have a variable speed control on the fans. Two-speed fan control may be added at a later date, when the final design is optimized.